

EXHIBIT A

JUL 29 2004

Docket No.: 50432-067

OFFICIAL

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of	:	Customer Number: 20277
Kai Yang et al.	:	Confirmation Number:
Serial No.: 09/817,056	:	Group Art Unit: 2811
Filed: March 27, 2001	:	Examiner: T. Nguyen
For: STABILIZING FLUORINE ETCHING OF LOW-K MATERIALS	:	

DECLARATION UNDER 37 C.F.R. §1.131

Mail Stop Declaration
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

We, Kai Yang, Darrell Erb and Fei Wang, hereby declare that:

1. We are the inventors of the invention disclosed and claimed in the above-referenced United States patent application.
2. We are aware of the prosecution history of this application which was filed in the U.S. Patent and Trademark Office on March 27, 2001. We are also aware that claims in the application have been rejected under 35 U.S.C. §102 for lack of novelty and under 35 U.S.C. §103 for obviousness predicated primarily upon U.S. Patent 6,521,533 issued to Morand et al. on February 18, 2003, based upon a PCT application filed on September 12, 2000.

WDC99 897588-1.050432.0067

Serial No.: 09/817,056

3. To our knowledge and in view of the factual evidence supplied herewith, the present invention was conceived in the United States prior to September 12, 2000 the filing date of the Morand et al. patent, as evidenced by the attached invention disclosure submitted to Advanced Micro Devices, Inc. (AMD), the assignee herein (Exhibit A hereto). Due diligence was exercised from prior to the September 12, 2000 filing date of the Morand et al. application to the filing date of the present application on March 27, 2001.

4. We further declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful statement may jeopardize the validity of the application or any patent issuing thereon.

Date

May 3, 2004

Date

Kai Yang

Darrell M Erb

Darrell Erb

Date

Fei Wang

JUL 29 2004

Docket No.: 50432-067

OFFICIAL

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of : Customer Number: 20277
Kai Yang et al. : Confirmation Number:
Serial No.: 09/817,056 : Group Art Unit: 2811
Filed: March 27, 2001 : Examiner: T. Nguyen
For: STABILIZING FLUORINE ETCHING OF LOW-K MATERIALS

DECLARATION UNDER 37 C.F.R. §1.131

Mail Stop Declaration
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

We, Kai Yang, Darrell Erb and Fei Wang, hereby declare that:

1. We are the inventors of the invention disclosed and claimed in the above-referenced United States patent application.
2. We are aware of the prosecution history of this application which was filed in the U.S. Patent and Trademark Office on March 27, 2001. We are also aware that claims in the application have been rejected under 35 U.S.C. §102 for lack of novelty and under 35 U.S.C. §103 for obviousness predicated primarily upon U.S. Patent 6,521,533 issued to Morand et al. on February 18, 2003, based upon a PCT application filed on September 12, 2000.

WDC99 897588-1.050432.0067

Serial No.: 09/817,056

3. To our knowledge and in view of the factual evidence supplied herewith, the present invention was conceived in the United States prior to September 12, 2000 the filing date of the Morand et al. patent, as evidenced by the attached invention disclosure submitted to Advanced Micro Devices, Inc. (AMD), the assignee herein (Exhibit A hereto). Due diligence was exercised from prior to the September 12, 2000 filing date of the Morand et al. application to the filing date of the present application on March 27, 2001.

4. We further declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful statement may jeopardize the validity of the application or any patent issuing thereon.

4/28/04
Date

Kai Yang
Kai Yang

Date

Darrell Erb

Date

Fei Wang

JUL 29 2004

Docket No.: 50432-067

OFFICIAL

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of

Kai Yang et al.

Serial No.: 09/817,056

Filed: March 27, 2001

For: STABILIZING FLUORINE ETCHING OF LOW-K MATERIALS

: Customer Number: 20277

: Confirmation Number:

: Group Art Unit: 2811

: Examiner: T. Nguyen

DECLARATION UNDER 37 C.F.R. §1.131

Mail Stop Declaration
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

We, Kai Yang, Darrell Erb and Fei Wang, hereby declare that:

1. We are the inventors of the invention disclosed and claimed in the above-referenced United States patent application.

2. We are aware of the prosecution history of this application which was filed in the U.S. Patent and Trademark Office on March 27, 2001. We are also aware that claims in the application have been rejected under 35 U.S.C. §102 for lack of novelty and under 35 U.S.C. §103 for obviousness predicated primarily upon U.S. Patent 6,521,533 issued to Morand et al. on February 18, 2003, based upon a PCT application filed on September 12, 2000.

WDC99 897588-1.050432.0067

Serial No.: 09/817,056

3. To our knowledge and in view of the factual evidence supplied herewith, the present invention was conceived in the United States prior to September 12, 2000 the filing date of the Morand et al. patent, as evidenced by the attached invention disclosure submitted to Advanced Micro Devices, Inc. (AMD), the assignee herein (Exhibit A hereto). Due diligence was exercised from prior to the September 12, 2000 filing date of the Morand et al. application to the filing date of the present application on March 27, 2001.

4. We further declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful statement may jeopardize the validity of the application or any patent issuing thereon.

Date

Kai Yang

Date

Darrell Erb

Date

4-13-04

Fei Wang

AMD INVENTION DISCLOSURE

TLD ID#

Sunnyvale x42110, return to MS68.

Rec'd date

Texas x55964 return to MS62

Project: ☐ Product: ☐ Process: ☐ Technology ☒ F0424 to which the invention applies (identify):

List 2 to 5 key words useful to search by to find patents or art related to this invention:

Damascene process Using Dielectric Barrier Films two different

Working title of invention:

INVENTOR/SESSION PARTICIPANT ADDRESS INFORMATION IS ON THE NEXT PAGE

Inventor's signature: [Signature] date: _____
Inventor's printed full name: Kai Yang Citizenship: _____
Employee #: _____ Extension: _____ Mail stop: _____ Home telephone: () _____
Division: _____ Directorate: _____ Dept #: _____ Dept: _____ Manager: _____
Residence address: _____
Post Office address: _____

Co-Inventor's signature: _____ date: _____
Co-Inventor's printed full name: Darrell Erb Citizenship: _____
Employee #: _____ Extension: _____ Mail stop: _____ Home telephone: () _____
Division: _____ Directorate: _____ Dept #: _____ Dept: _____ Manager: _____
Residence address: _____
Post Office address: _____

Co-Inventor's signature: _____ date: _____
Co-Inventor's printed full name: _____ Citizenship: _____
Employee #: _____ Extension: _____ Mail stop: _____ Home telephone: () _____
Division: _____ Directorate: _____ Dept #: _____ Dept: _____ Manager: _____
Residence address: _____
Post Office address: _____

Co-Inventor's signature: _____ date: _____
Co-Inventor's printed full name: Fei Wang Citizenship: _____
Employee #: _____ Extension: _____ Mail stop: _____ Home telephone: () _____
Division: _____ Directorate: _____ Dept #: _____ Dept: _____ Manager: _____
Residence address: _____
Post Office address: _____

List on additional sheet if there are more co-inventors and list total number of inventors here: _____

Name(s) of attorney(s) preferred by inventor(s) to prepare patent application, if known:

LAW FIRM: MCDERMOTT, WILL & EMERY—John Hankins and Arthur Steiner

Witness 1 initial: _____

Witness 2 initial: _____

AMD CONFIDENTIAL

Page 1

IDF COVER SHEET—gpt 2 DB 7/31/95 printed: June 1, 2000 7:20 PM

page rev 11/25/96

AMD INVENTION DISCLOSURE

TLD ID#
Sunnyvale x42110, return to MS68,Rec'd date
Texas x55964 return to MS62

Identify known relevant art (patents, publications, products):

State the problem solved by this invention:

Use dielectric Film instead of metal barrier. Solve Step coverage problem. Reduce Contact resistance. Enhance electromigration. Reduce capacitance.

Brief description and/or sketch of invention (please attach copies of AMD patent notebook pages, reports or drawings):

Current Copper Damascene technology use metal as barrier films such as Ta, TaN, Ti, TiN, W, W₂C, etc. These films have much higher electrical resistivity than the Copper, ~~Aluminum~~ aluminum, or Silver. Some of these film can only be deposited using PVD at present (sputtering), for example Ta, TaN, which have low step coverage. Dielectric barrier film can be deposited by CVD process and hence have good step coverage. These dielectric barrier film are SiN, SiC, etc. By using the process flow illustrated in the Figure, the barrier wall coverage can be more uniform. Because there is no ~~higher~~ metal barrier between the via and line, the contact resistance can be significantly reduced. The direct Copper via and Copper line contact also enhance electromigration. Finally, at the same metal ~~line/via~~ line/via size, the parasitic capacitance is reduced.

Patent notebook #

Page numbers

Number of drawings

Witness 1 initial:

Witness 2 initial:

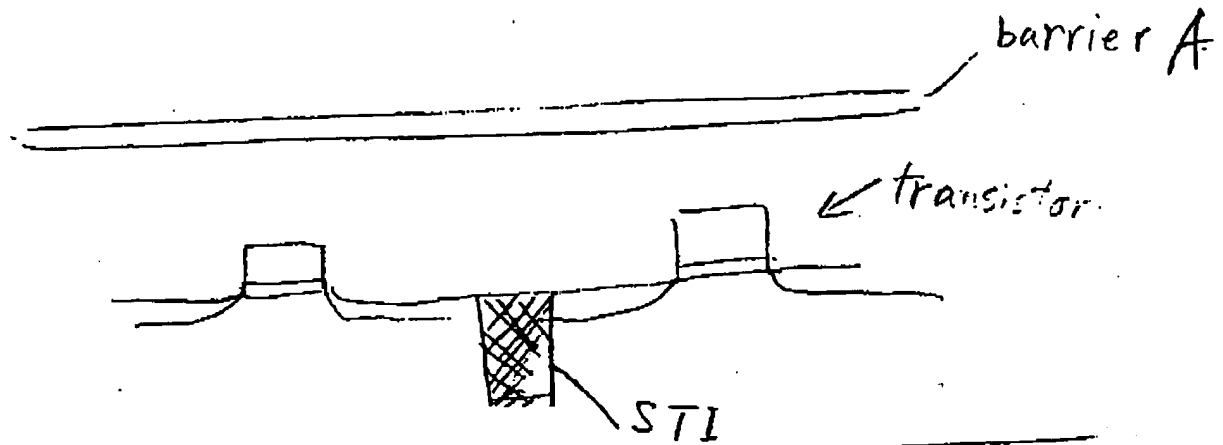
AMD CONFIDENTIAL

Page 2

IDFPAPER01.DB 7/31/95 printed June 1, 2000 7:15 PM. page rev 11/25/96

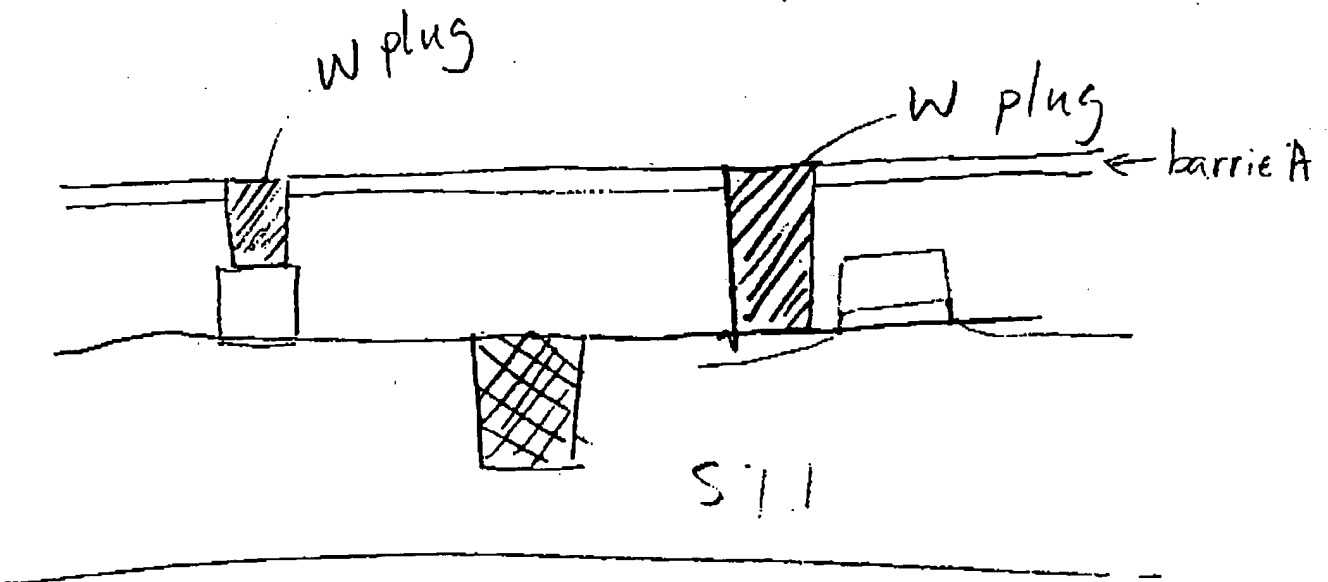
Invention #67

①



Deposit dielectric & dielectric barrier A after formation of Transistors

②



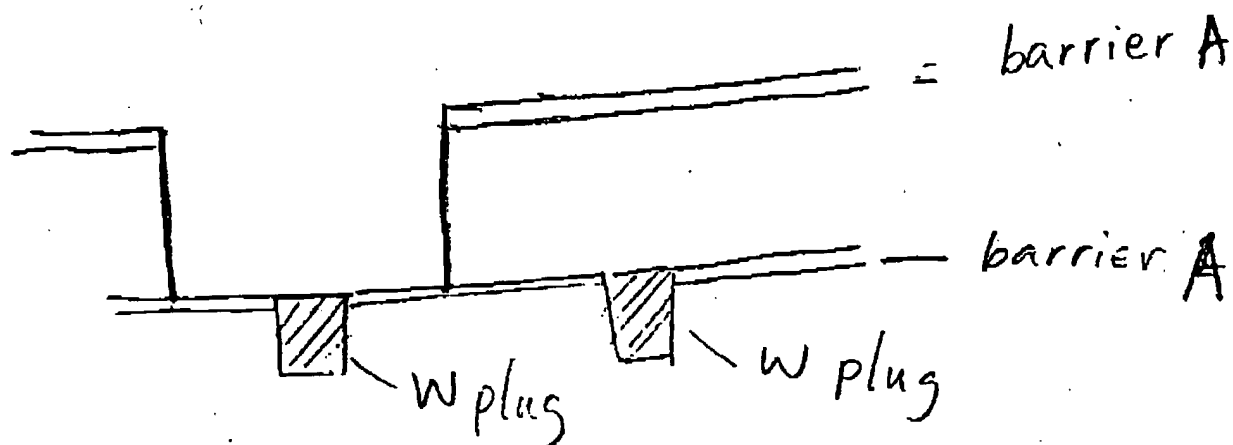
W plug formation

RECEIVED

JUL 29 2004

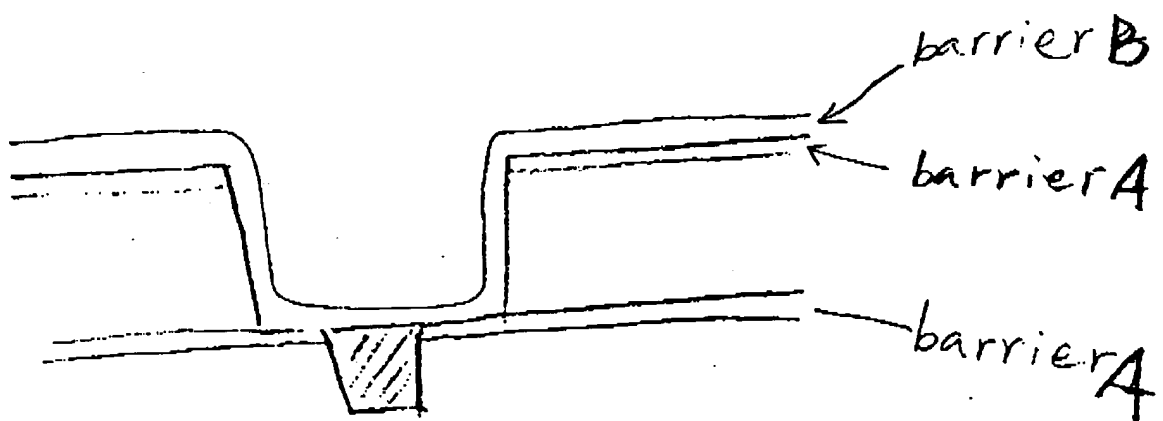
11 58 11

(3)



Deposition dielectric & barrier A
~~etch~~ patterning, etch trench

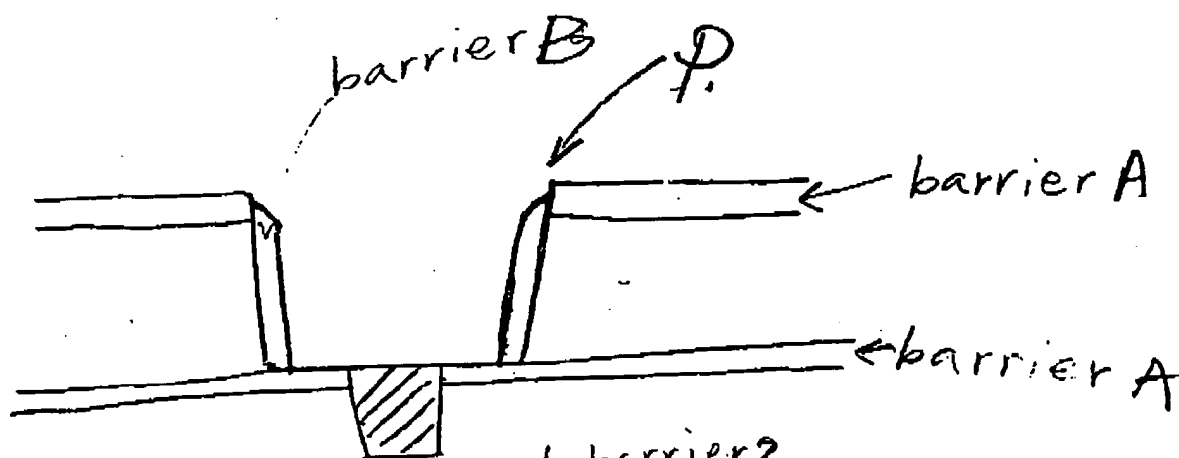
(4)



Deposition of barrier B film

07/29/04
12:02 PM
07/29/04

(5)

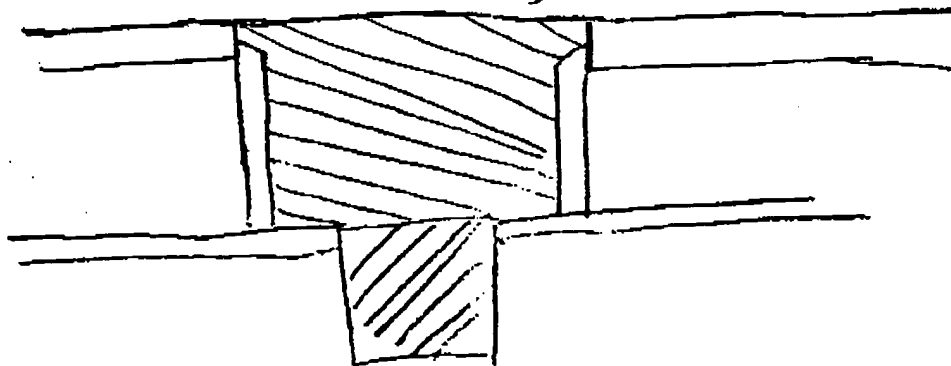


Unisotropic etch ^{of barrier 2} with selectivity to barrier A.

Barrier A thickness preferably thicker than that of barrier B, so that dielectric will not be exposed at point P

Copper

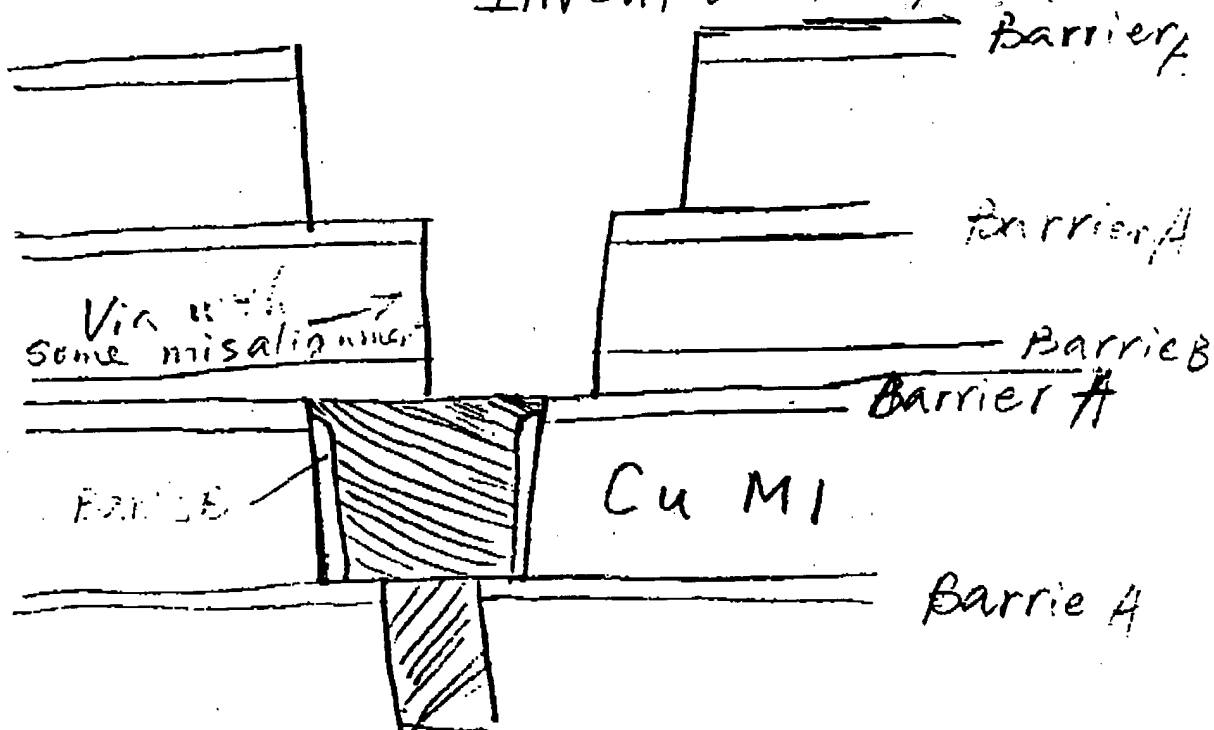
(6)



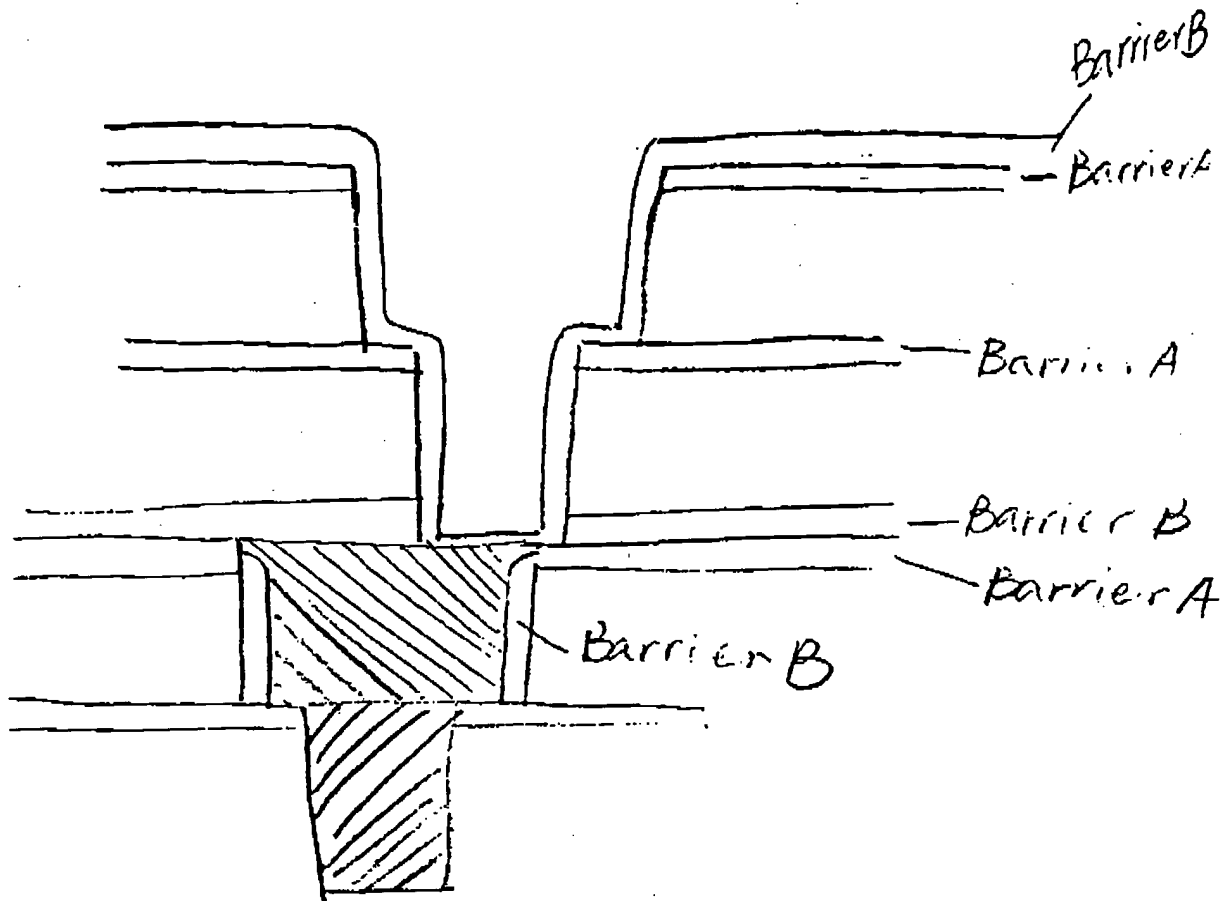
Fill copper & CMP

Invention # 67

5)
7)



Deposition dielectric and barrier stack.
patterning



Deposit Barrier B.

